STATE OF CALIFORNIA
DEPARTMENT OF GENERAL SERVICES - PROCUREMENT DIVISION

CONTRACT NOTIFICATION

***** MANDATORY *****

CONTRACT NUMBER: **1-07-63-02**

DESCRIPTION: **MODEL 170 TRAFFIC CONTROLLER AND LED TRAFFIC SIGNAL MODULES**

CONTRACTOR: **VARIOUS**

EFFECTIVE DATES: **8/10/2007** THROUGH **8/ 9/2009**

SUPERSEDES CONTRACT NO.:

AREA: **STATEWIDE**

DISTRIBUTION: **BY DOT**

* TAX: Add appropriate sales and use tax.
Exempt from Federal Excise Tax.

*Food contracts are tax exempt.

Rita Hamilton

RITA HAMILTON, Deputy Director

Use of this agreement by all agencies is mandatory with monetary exceptions stated herein or contained in State Administrative Manual.

To obtain assistance or report non-compliance by supplier, or for any suggestions or recommendations write:

Department of General Services, Procurement Division, P.O. Box 989054, W. Sacramento, CA 95798-9054,
or call: Contract Administrator, **WILLIAM RODRIGUEZ** 916-375-4462

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SUPPLIER ID: 134203
NAME: SAFETRAN TRAFFIC SYSTEMS INC
ADDRESS: 1485 GARDEN OF THE GODS
COLORADO SPGS, CO 80907

CONTACT: 714-630-3700 LINSEY JIMENEZ
FAX NUMBER: 714-630-6349
TERMS OF PAYMENT: Net
FOB: Destination
MINIMUM ORDER:

SUPPLIER ID: 153034
NAME: TRAFFIC SENSOR CORPORATION
ADDRESS: 173 SOUTH G ST
SAN BERNARDINO, CA 92410

CONTACT: 909-388-1300 BRUCE HOWARD
FAX NUMBER: 909-388-1115
TERMS OF PAYMENT: Net
FOB: Destination
MINIMUM ORDER:

SUPPLIER ID: 224656
NAME: MCCAIN INC
ADDRESS: 2365 OAK RIDGE WAY
VISTA, CA 92081

CONTACT: 760-734-5016 DIANE HAWKINS
FAX NUMBER: 760-597-7103
TERMS OF PAYMENT: Net
FOB: Destination
MINIMUM ORDER:

SUPPLIER ID: 349990
NAME: ELECTRO-TECH'S
ADDRESS: 1875 SAMPSON AVE
CORONA, CA 92879

CONTACT: 951-734-1812 RAY DEESE
FAX NUMBER: 951-734-5424
TERMS OF PAYMENT: Net
FOB: Destination
MINIMUM ORDER:

SUPPLIER ID: 673900
NAME: WESTERN PACIFIC SIGNAL LLC
ADDRESS: 1793 E 14TH ST
SAN LEANDRO, CA 94577

CONTACT: 510-483-6400 DONALD R SHUPP
FAX NUMBER: 510-483-1402
TERMS OF PAYMENT: Net
FOB: Destination
MINIMUM ORDER:

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SUPPLIER ID:	767230	
NAME:	STAY SAFE STORE	
ADDRESS:	3941 PARK DR, STE 20 #297 EL DORADO HILLS, CA 95762	
CONTACT:	888-782-7233	KEN SHOEMAKE, EXT 3
FAX NUMBER:	866-676-8873	
TERMS OF PAYMENT:	Net	
FOB:	Destination	
MINIMUM ORDER:		

SCOPE:

This contract covers the estimated biennial (two-year) requirements of the State of California, Department of Transportation and participating local agencies for MODEL 170 TRAFFIC CONTROLLER, per the attached State of California, Department of Transportation (DOT), Qualified Products List (QPL), dated January 2007, and the Pre-Qualified Products List (P-QPL) for LED Traffic Signal Modules, revised date 9/7/2006. Only products contained on these "QPLs" will be acceptable. This contract is "Mandatory" for State departments only.

A local agency is any city, county, city, county, city and county, district, or other local governmental body or corporation empowered to expend public funds (California Public Contract Code Section 10298).

CONTRACT TERM:

This contract is for a two (2) year term. This contract contains an option for one (1) contract extension. The contract extension period shall not exceed twelve (12) months. The terms, conditions, and prices for the contract extension option shall be by mutual agreement between the contractor(s) and the State. If a mutual agreement cannot be met, the contract may be terminated at the end of the current contract term and/or contract extension(s).

SPECIFICATION COMPLIANCE:

All Controller Assemblies for Model 170 Traffic Controller shall be furnished in accordance with attached State of California Qualified Products List (QPL) dated January 2007, and shall be compliant with the following specifications:

TRAFFIC SIGNAL CONTROL EQUIPMENT SPECIFICATIONS (TSCES) dated January 1989 plus applicable Addendum.

TRANSPORTATION ELECTRICAL EQUIPMENT SPECIFICATIONS (TEES) dated August 16, 2002, plus Errata 1 dated 10/27/2003 and Errata 2 dated 06/08/2004.

Copies of the TSCES and TEES Publication(s) are available for purchase at the following address:

Caltrans Publications Unit
1900 Royal Oaks Dr.
Sacramento, CA 95815

Phone: (916) 445-3520
Fax: (916) 324-8997

All LED Traffic Signal Modules shall be furnished in accordance with attached Pre-Qualified Products List (P-QPL) for LED Traffic Signal Modules, revised date 9/7/2006, and shall be compliant with the following specifications:

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LED Pedestrian Signal Modules Combination Specifications, dated 2/28/2007, of 7 pages.

LED Signal Modules Specifications, dated 2/28/2007, of 14 pages.

PRICE:

Unless escalation is requested, all prices quoted for material costs shall be fixed as the maximum cost for the contract term, including any contract extension(s). All prices quoted shall be F.O.B. Destination and shall include associated costs as described under "SITE VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS", as indicated at the line item level.

PRICE ESCALATION - MATERIAL COSTS AND FUEL COSTS:

Material Costs:

If requested, the contractor(s) may submit a proposed price escalation, in writing (for other than fuel costs, see Fuel Costs below), to the Department of General Services (DGS), Procurement Division, Contract Administrator no earlier than three hundred (365) calendar days after award. Such notice shall be provided at least thirty (30) calendar days in advance of the proposed effective date of the price escalation.

1. Upon receipt of such notice, the State reserves the right to exercise the following options:

   a. Accept the escalation as competitive with the general market price at that time, effective forty-five (45) calendar days after receipt of an acceptable notice; or the State may choose to

   b. Negotiate a proposed alternative price escalation. Note: The State will notify, in writing, the contractor of its intention to negotiate. The State will have twenty (20) working days to complete negotiations; or the State may

   c. Cancel any unpurchased balance of the contract without prejudice, effective upon written notice from the State.

   Note: If negotiations fail to produce an agreement, the State reserves the right to exercise Options 1.a or 1.c with an effective date no later than ten (10) working days after unsuccessful negotiation.

2. No price increase shall apply to quantities ordered from the contract prior to the effective date of the price escalation as authorized by the State via an approved supplement to the contract.

3. Any accepted price escalation increase shall be fixed as the maximum price for a period of not less than three hundred sixty five (365) calendar days from the effective date of the approved price escalation, as described above, and/or through the date of contract termination or contract extension(s), as approved by the State per mutual agreement with the contractor(s).

Fuel Costs:

1. Unless escalation is requested, all prices quoted for fuel costs shall be fixed as the maximum cost for the contract term, including any contract extension(s).

2. If requested, the contractor(s) may submit proposed price escalation notice for fuel costs, in writing, to the DGS Procurement Division Contract Administrator when the cost of fuel has increased no less than ten percent (10%) from the original fuel cost and after one hundred eighty (180) calendar days from the effective date of the contract or from the effective date of the most recent price increase. Such price escalation request shall be provided at least thirty (30) calendar days in advance of the proposed effective date of the price escalation and shall include substantiated information to support the proposed escalation

from the published OPIS (Oil Price Information Service), the market indicator for the fuel industry. The DGS Procurement Division tracks and monitors such fuel changes at the following web site: www.pd.dgs.ca.gov/contracts/fuelrates.

3. Upon receipt of such notice, the State reserves the right to exercise the following options:

   a. Accept the escalation as competitive with the general market price at that time, effective forty-five (45) calendar days from written approval from the State; or the State may choose to

   b. Negotiate a proposed alternative price escalation. Note: The State will notify the contractor, in writing, of its intention to negotiate. The State will have twenty (20) working days to complete negotiations; or the State may

   c. Cancel any un-purchased balance of the contract without prejudice, effective upon written notice from the State.

   Note: If negotiations fail to produce an agreement, the State reserves the right to exercise Options 3.a or 3.c with an effective date no later than ten (10) working days after unsuccessful negotiation.

4. No price increase shall apply to quantities ordered from the contract prior to the effective date of the price increase as authorized by the State via an approved supplement to the contract.

5. Any accepted price escalation increase shall be fixed as the maximum price for a period of not less than one hundred eighty (180) calendar days from the effective date of the approved price escalation, as described above, and/or through the date of contract termination or contract extension(s), as approved by the State per mutual agreement with the contractor(s).

PRICE DECLINES:

The Contractor shall immediately notify the Contract Administrator of all manufacturers' price declines and the State shall receive full benefit of such declines, effective on the date of manufacturer's public announcement.

QUANTITIES:

Quantities as described for each line item on the bid sheets are estimated for evaluation purposes only. The estimated quantities are based upon historical purchasing for a two (2) year period. Actual purchasing may vary from this pattern. The State will not guarantee any specific quantities will be purchased. The State will not be obligated to purchase contractor(s)'s excess inventory if actual purchases vary from the anticipated purchasing pattern. The State reserves the right to order more or less of any line item in this contract.

CONTRACT DOLLAR VALUE:

The State's authorization to place orders against this contract is based solely on funds that are appropriated by the State for the acquisition of the products on this contract. Therefore, there is no guaranteed contract dollar value. If funds are not appropriated for future fiscal years, the contract dollar value indicated at the time of award, will be reduced accordingly. Receipt of a State purchase order referenced under the contract number, shall be proof of availability of funds for that order.

The State will be excused from purchasing from this contract due to closure of State facilities, changes to or cancellation of State programs, by reduction of product usage, or because of lack of fiscal appropriations. The Contractor(s) shall refuse to accept any orders after a date set for contract termination and the State may disclaim liability for any purchases made after such date.

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Note: In the event of an emergency, the State reserves the right to make purchases of any line item off contract.

EXTRAORDINARY EXTENSION OPTION:

In the event of an extraordinary circumstance, the State may extend the contract for up to an additional year beyond the stated term and any noted extensions. Extensions during this period may occur in increments until the establishment of a new contract (not to exceed one (1) year). Exercise of this option may occur in the event that a replacement contract cannot be established due to protest of an "Intent to Award", loss of key procurement staff, or any other extraordinary circumstance that would otherwise cause an unanticipated disruption in the contracting process.

If necessary, prices may be increased during an extraordinary extension option period, to the extent that the price is determined to be "fair and reasonable". Requests for price increases shall include substantiated information to support the proposed increase (e.g., manufacturer's price list, significant changes in published market indicators for the industry, certified raw material cost data, or any other substantiating information as requested by the State). In no event will price increases be accepted with retroactive effective dates.

MINIMUM ORDER:

The minimum order point shall be indicated at the line item level, and/or as specified on the purchase order.

CONTRACTOR ORDERING INFORMATION:

By signing and submitting the solicitation, the contractor(s) agrees to accept State and local purchase orders by facsimile, e-mail, or U.S. Mail. List below the business address, facsimile, and e-mail address to which orders should be sent:

Company Name:	Safetran Traffic Systems, Inc.
Street Address:	1485 Garden of the Gods Road
City, State, and Zip:	Colorado Springs, CO 80907
Contact Person:	Linsey Jimenez
Facsimile Number:	(714) 630-6349
E-Mail Address:	ljimenez@econolite.com

Company Name:	Stay Safe Store
Street Address:	3941 Park Drive, Ste. 20, #297
City, State, and Zip:	El Dorado Hills, CA 95762
Contact Person:	Ken Shoemake
Facsimile Number:	(866) 676-8873
E-Mail Address:	staysafestore@comcast.net

Company Name:	McCain Inc.
Street Address:	2365 Oak Ridge Way
City, State, and Zip:	Vista, CA 92081
Contact Person:	Diane Hawkins
Facsimile Number:	(760) 597-7103
E-Mail Address:	dhawkins@McCain-Inc.com

Company Name:	Traffic Sensor Corp.
Street Address:	PO Box 5862
City, State, and Zip:	San Bernardino, CA 92412
Contact Person:	Bruce Howard
Facsimile Number:	(909) 388-1115
E-Mail Address:	tscc@tscorp1.com

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Company Name:	Western Pacific Signal, LLC
Street Address:	1793 E. 14th Street
City, State, and Zip:	San Leandro, CA 94577
Contact Person:	Donald R. Shupp
Facsimile Number:	(510) 483-1402
E-Mail Address:	shupp@wpsignal.com

Company Name:	Electro-Tech's
Street Address:	1875 Sampson Avenue
City, State, and Zip:	Corona, CA 92879
Contact Person:	Ray Deese
Facsimile Number:	(951) 734-5424
E-Mail Address:	ray@electro-techs.net

Please Note:

Ordering information by line item number(s), the following item numbers shall be provided by the contractors referenced above, as follows:

Contractor's Name	Line Item #(s)
Safetran Traffic Sys.	#1, #4, & #11
Stay Safe Store	#2 & #9
McCain, Inc.	#3, #6, & #8
Traffic Sensor Corp.	#5 & #10
Western Pacific Signal	#7, #12, & #21
Electro Tech's	#13 through #20

ORDER CONFIRMATION:

Within 48 hours, the contractor(s) must confirm receipt of the purchase order either via e-mail or facsimile, providing the user a receipt acknowledging the order. The acknowledgement must include total cost and delivery date information.

ORDERING PROCEDURE:

State agencies shall submit a complete Purchasing Authority Purchase Order (STD. 65) directly to the contractor. The Purchasing Authority Purchase Order (STD. 65) shall contain (but not be limited to) the following information.

1. Agency Bill Code
2. Purchasing Authority Purchase Order Number (PO No.)
3. Leveraged Procurement Agreement Number (Contract No.)
4. Supplier Information (Contact Name, Address, Phone Number, Fax Number, E-Mail)
5. Line Item Number
6. Quantity
7. Unit of Measure
8. Commodity Code Number
9. Recycled Product
10. Product Description
11. Unit Price
12. Extension Price

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Note: Contractor shall not accept orders from State agencies without a State-issued bill code.

State agencies shall submit copies of all purchase orders to:

DGS-Procurement Division
Attn: Data Entry Unit
P.O. Box 989052
West Sacramento, CA 95798-9052

DELIVERY REQUIREMENTS:

Shipment(s) shall be delivered in production lot order, carton(s) shall be marked with the CALTRANS (CT #) stock item number(s). Each unit from a single lot shall be permanently marked or labeled with a unique, consecutive, and/or sequential serial number(s), and production date(s). A packing list of unit production date(s) and unit serial number(s) contained within the shipping carton shall be affixed to the outside of every carton. In addition, the State Purchasing Authority Purchase Order number, company name, device description, item number(s) and serial number(s) shall be indicated on each and every shipping carton.

Delivery of the item(s) on the purchase order must be made within the time frame specified in the order. Acceleration of delivery or a series of deliveries, whether for the benefit of the supplier or the benefit of the State, must be coordinated and approved in advance with the agency contact listed on the first page of the purchase order.

Shipments not in compliance with CALTRANS specifications, acceptance testing criteria, or other acceptance criteria as specified in the contract, or with the delivery schedule indicated on the purchase order, will be subject to refusal or rejection, and will be returned freight collect to the originating supplier. By mutual agreement with the State, the supplier shall provide a return shipment "authorization account number" to the point of origin or supplier (whichever is applicable) by common carrier.

Previously rejected or reworked units shall be shipped in a separate shipping carton(s) and affixed with a shipping label(s) in such a way as to identify the units as reworked parts, and to identify the previous and replacement serial number(s).

In addition, each shipment shall include shipping label(s) with all serial numbers listed. See "Shipping Carton Label Instructions", label samples, packaging, marking, and palletization requirements for LED Modules.

Unless otherwise specified, delivery will be to:

California Department of Transportation
2001 Evergreen Street
Sacramento, CA 95815

DELIVERY SCHEDULE:

First delivery shall be within sixty (60) days After Receipt of Order (ARO). Minimum delivery shall be indicated for each line item and/or as indicated on the purchase order. This contract will be separate from any other contract. Deliveries required as a result of this contract shall not be withheld due to the unavailability of goods for delivery under any other contract.

The State and the Contractor(s) shall work closely to assure that delivery is coordinated. The Contractor(s) shall have the responsibility to provide reasonable notice to the receiving location within one (1) working day of an impending delivery and of any changes in the delivery after that time.

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PALLET REQUIREMENTS:

All pallets employed in the delivery of the product shall be of sturdy construction and adequate condition to assure delivery without damage to the product and to insure prevention of safety hazards. All pallets must comply with the State of California Specification 3990-01A-01, dated January 2001.

All pallets shall be palletized on 42" x 42" wooden pallets. Height of load on pallet shall not exceed 54" measured from floor to top of stack. Load including pallet shall not exceed 3,000 pounds. Load must be secured to the pallet with strapping or shrink-wrapped, and must not extend over the pallet.

CONTRACTOR RESPONSIBILITY:

1. Contractor shall perform all deliveries to facilities in a safe and professional manner. Contractor's equipment shall be in good working order and all personnel shall be trained in safety measures to preclude accidents endangering personnel or property.

2. Contractor must commit to delivery as requested, at time stated on accepted orders, through the term of the contract.

3. Contractor shall provide office and personnel resources for responding to requests, including telephone coverage weekdays during the hours of 8:00 AM through 5:00 PM (PST).

INVOICING REQUIREMENTS:

The contractor is to render invoices as instructed on individual orders. Invoices must use the contractor's invoice that includes at a minimum:

1. Contractor's name, address, and telephone number
2. Leveraged Procurement Agreement Number (State's Contract Number)
3. Agency Purchasing Authority Purchase Order number
4. Item and commodity code number
5. Quantity purchased
6. Contract price and extension
7. State sales and/or use tax
8. Prompt payment discounts/cash discounts, if applicable
9. Totals for each order

The State's obligation to make payment pursuant to the contract is subject to availability of appropriation funds. Receipt of a Purchasing Authority Purchase Order under this contract is proof of funds for that order.

PAYMENT:

The State will make payment in accordance with Paragraph 30 of the General Provisions. The dollar value of the units rejected will be deducted from the contractor's invoice. The State may also deduct from any compensation otherwise payable to the contractor, any testing costs, or other proper credits due and payable to the State. Cash discounts, if offered, will be calculated from date of acceptance after the testing period, or thirty (30) days after receipt of the items, whichever occurs first.

CONTRACT USAGE REPORTING:

The contractor shall provide a quarterly detailed usage report by line item and commodity code to the Contract Administrator in Excel format via e-mail or U.S. Mail on a CD. All reports are due by the 15th day following the ending of a contract quarter. Report shall contain the following elements:

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1. Leveraged Procurement Number (Contract Number)
2. Purchasing Authority Purchase Order (Std. 65) Number
3. Date of the Purchasing Authority Purchase Order
4. Reporting Quarter
5. Agency Identifier (State)
6. Ordering Agency Name (Location)
7. Agency Bill Code
8. Delivery Date
9. Line Item Number
10. Commodity Code Number
11. Manufacturer Part Number
12. Item Description
13. Quantity
14. Unit of Measure
15. Unit Price
16. Extended Amount
17. Invoice Number
18. Date of Invoice

Note: Sample usage report is included with the contract documentatation.

REPORTING COMPLIANCE:

Contractor shall comply with the reporting requirements as specified. If contractor fails to meet delivery times as specified for any one of the required reports, a one percent (1%) discount will be applied to the contract pricing on all future orders for 30 days or until the delinquent report(s) are delivered, whichever is greater. At the end of the thirty days or at the time of delivery, the discount will revert to the original contract price.

Contract pricing discounts for reporting non-compliance will commence three (3) months after contract award. Failure to submit completed quarterly reports within the time period required may be considered a breach of contract and subject the Contractor to "Rights and Remedies of State for Default."

SITE VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS

Prior to the start of production, all Listed equipment shall be inspected as needed by one (1) or maximum of two (2) CALTRANS engineers depending on certain conditions as identified by CALTRANS. This "Pre-Production inspection meeting" shall occur before actual production begins and shall be conducted at the manufacturer's facility. Site visitation(s), pre-production and production meeting(s), may be conducted by Electrical Engineers from the State of California Department Laboratory (Translab) for specification and contract compliance. During the visit, the manufacturer shall have a unit(s) available for evaluation.

The "Inspection Costs" for all site visitation(s), pre-production and production meetings, shall be the responsibility of the manufacturer and shall include all reasonable expenses (but not limited to), travel to and from the manufacturer's facility, lodging, and meals, for a maximum of two engineers (See "Inspection Costs" below). Each visit shall last approximately two (2) to three (3) working days at the manufacturer's facility. All inspection costs shall be itemized, receipts, and other related documentation shall be made available by CALTRANS.

The purpose of the meeting(s) will be to ensure that all aspects of the specification and contract are clearly understood by both the State and the manufacturer prior to the delivery of shipments to CALTRANS.

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During production and/or any subsequent period during the term of the contract, site inspection(s) or production meeting(s) may be conducted by one (1) and/or maximum of two (2) CALTRANS engineers, depending on the certain conditions as identified by CALTRANS. Site inspection(s) by electrical engineers from the Translab shall occur at the manufacturer's facility, in order to ensure that production is meeting quality assurance standards, and to resolve any non-compliance issues discovered during testing of the initial (or subsequent) shipment(s).

INSPECTION COSTS:

Transportation Laboratory inspection costs incurred by the State at the Contractor's manufacturing facility will be deducted from each invoice before the addition of taxes and payment. The following rates apply dependent upon the zone in which the Contractor is located.

ZONE	AIR MILES FROM LOS ANGELES OR SACRAMENTO INSPECTION OFFICE	RATES
1	0 to 199	1.6%
2	200 to 999	4.0%
3	1000 or more	4.6%

Where fabrication takes place in more than one zone, payment will be computed on the basis of the entire fabrication taking place in the farthest zone.

REJECTION AND ACCEPTANCE:

The State may reject any item or an entire shipment which is not in compliance with the specifications or which is in breach of warranty, express or implied, or which is otherwise defective. The State will test and either accept or reject each item or shipment within thirty (30) calendar days of delivery to the Transportation Laboratory. All initial tests shall be at the State expense. All testing subsequent to rejection of the equipment for failure to comply with specifications requirements will be at the expense of the supplier. Deductions to cover the cost of such testing will be made from any monies due or which may become due the supplier under this purchase order.

DISPOSITION OF REJECTED ITEMS:

Rejected items or shipments will be returned to the supplier by common carrier at the supplier's expense and risk unless the supplier notifies the Department of Transportation Laboratory, that the supplier will pick up rejected items within seven (7) working days of notification(s). .

WARRANTY:

The warranty period of all items in this contract (other than the LED Combination Pedestrian Sign Modules and LED Signal Modules) shall begin upon acceptance of the items by the State when testing by the Translab is complete for each minimum order / shipment indicated at the line item and/or purchase order, and shall extend for twenty-four (24) months. LED Combination Pedestrian Signal Modules and LED Signal Modules warranty period shall begin upon acceptance of the items by the State when the testing by the Translab is complete for each minimum order / shipment indicated at the line item and/or purchase order, and shall extend for sixty (60) months. This time period shall be extended by the amount of time between the State's notice to the Contractor of a defect in the equipment and the Contractor's replacement or repair of said equipment and return of said equipment to the State.

Should any of the equipment prove defective due to failure to conform with the order's specifications or due to otherwise defective workmanship or materials within the specified warranty period, the Contractor agrees, upon demand by the State, to replace or repair said defective equipment without cost to the State, or to reimburse the State, upon demand, for the State's expense incurred in replacing or repairing said equipment.

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The Contractor warrants that the equipment covered by this order to be of merchantable quality and to be fit for use in controlling automobile traffic. The Contractor agrees to indemnify and hold the State harmless from all claims, liability, loss, damage, and expense incurred or sustained by the State by reason of any breach of such warranties.

MANUFACTURING QA/QC MANUAL PROCEDURES MUST BE AVAILABLE TO THE STATE:

At any time, including prior to award of this contract, the State may request factory Quality Assurance and Quality Control Procedures applicable for the equipment being offered on this contract.

PURCHASE ORDER ALTERATIONS TO DEPARTMENT OF TRANSPORTATION (DOT) PURCHASE ORDER AMENDMENTS:

The DOT purchase order(s) may be amended, modified or terminated at any time by mutual agreement of the parties, in writing. Any DOT purchase order amendment, modification, or termination of the purchase order, including any modification of the compensation payable(s) may be issued only by the DOT Contracts Procurement Officer. All such alterations shall be in writing and shall be issued only upon the written request of the DOT requisitioning department with the written concurrence of the Contractor. Termination, as that term is used in this section, does not include termination for default of the Contractor. The Contractor may submit proposed Purchase Order Alteration requests, in writing, to the Department of Transportation, Materiel Operations Branch, at any time after receipt of the purchase order.

David D. Song
170 / 2070 Controller Program Coordinator
(916) 654-4591
CALNET 8-464-4591
Email Address: david_song@dot.ca.gov

Theresa A. Gabriel
Office of Electrical Systems
(916) 654-4591
CALNET 8-464-4591
Email Address =
Theresa_A_Gabriel

Note: All other State departments will process purchase order amendments in accordance with State requirements. Local agencies will process purchase order amendments in accordance with local agency requirents.

LIQUIDATED DAMAGES:

In the event that delivery orders are not completed and shipped within the specified time frames as set forth in this contract, it is agreed that a delay has occurred and that the order is subject to liquidated damages (unless the delay is authorized by the DOT or Deputy Director, Department of General Services, Procurement Division). Whereas, it is impractical to ascertain and determine the damage sustained by the State in the event of (and by reason of) such delay, it is agreed that the Contractor pay the State six percent (6%) of the price of each shipment per calendar day for each and every calendar day that the work remains uncompleted or unacceptable by the State's assessment, provided total damages assessed against the Contractor do not exceed fifty percent (50%) of the total value of the entire order. The Contractor agrees to pay said liquidated damages as provided herein. In the event that such damages are not paid, the Contractor agrees that the State may deduct the amount thereof from any monies due or that may become due to the Contractor.

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PATENTED MATERIALS:

The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work and production and agrees to indemnify and save harmless the State, the Department of Transportation (DOT) and their duly authorized representatives from all suits at law, or action of every nature for, or on account of, the use of any patented materials, equipment, devices, or processes.

OFFICE EQUIPMENT:

The DOT uses office equipment commercially available in the public domain. The contractor(s) is expected to operate and maintain (at its own expense) compatible computer workstations, facsimile copiers, color printers, scanners, and digital cameras as necessary for the conduct of business with the State under this contract. The contractor(s) will be required to electronically transmit and receive various word documents, spreadsheets, fabrication details, purchase orders, drawings, and color digital photographs. The contractor(s) is expected to have sufficient office equipment available to its staff to handle the workload that can reasonably be expected under this contract.

LED SIGNAL MODULES; PACKAGING, MARKING, AND PALLETIZATION INSTRUCTIONS:

Packing shall be consistent with standard commercial practices sufficient to protect the goods.

LED Signal Modules are to packed in quantities of three (3) to eight (8) units per carton. Each carton shall weigh no more than twenty-two (22) pounds. Each carton shall be marked with the description of the module, the appropriate CALTRANS (CT) number stated in the specification (and/or IFB line item), contractor name, purchase authority purchase order number, product order number, product model number, and serial number range for units included in the carton. Cartons shall be marked with "CALTRANS" in one (1) inch letters. All other markings will be as large as the CALTRANS lettering as possible and must be legible. If units have been previously rejected, the box will be marked to indicate the units were re-worked. All markings shall be done with the waterproof ink directly on the carton or using a permanent label.

Palletization shall be in accordance with pallet specifications noted in the IFB and contract. The maximum pallet/load level shall be not exceed fifty-four (54) inches (137.2 centimeters) from the bottom of the pallet to the top of the load unless otherwise agreed to by the CALTRANS contact person on the purchase order. Cartons shall be secured to the pallet using shrink-wrap or other means to prevent shifting of the load during transit. Each pallet shall have a packing slip listing the serial numbers of the modules, along with the phone number of the contact person on the order. Unless otherwise agreed to in writing, only one LED Module type shall be included on a pallet. Variable module type(s) are not to be mixed on a single pallet.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
1	6310-600-0180-7	134203	EA	CABINET TRAFFIC CONTROLLER Model 334C Cabinet with PDA 3 (DOT #7440-0100-1), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Cabinet Finish: Anodized. Price to include the following: Model 208 Monitor, per attached Specification of 6 pages, and software for the testing system, to be included with the initial order. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand (Mod 334C): SAFETRAN Model: 334C Brand (Tester): SAFETRAN Model: PGMCT170 Delivery - Item 1 DOT Minimum Delivery: 50	2,580.0000

Note: First delivery to the DOT Warehouse shall be within 60 days ARO, delivery schedule shall be indicated on the DOT Purchase Order as described above.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
2	6310-600-0541-2	767230	EA	MODEM TRAFFIC CONTROL SYSTEM DOT MODEL 400 Modem, Model 400 (DOT #7440-0130-4), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Brand: GDI Model: 400 modem Delivery - Item 2 DOT Minimum Delivery: 100 Note: First delivery to the DOT Warehouse shall be within 60 days ARO, delivery schedule shall be indicated on the DOT Purchase Order as described above.	99.3600
3	6310-600-0475-4	224656	EA	MODULE TRAFFIC CONTROL SYSTEM Controller, Model 170E with Program Module, with Program Module 412C (DOT #7440-0173-4), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Brand: McCAIN Model: 170E with 412C Delivery - Item 3 DOT Minimum Delivery: 100 Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Note: First delivery to the DOT Warehouse shall be within 60 days ARO, delivery schedule shall be indicated on the DOT Purchase Order as described above.	975.0000

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
4	6310-600-0180-7	134203	EA	CABINET TRAFFIC CONTROLLER Model 332A Cabinet with PDA 2, and two PDC Model 204 Flashers (DOT #7440-0179-7), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Cabinet Finish: Anodized. Price to include: Model 210 Monitor, per attached Specification of 6 pages, and software for the testing system, to be included with the initial order. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand (Mod 332A): SAFETRAN Model: 332A Brand (Tester): SAFETRAN Model: PGMT170 Delivery - Item 4 DOT Minimum Delivery: 50	3,339.0000

Note: First delivery to the DOT Warehouse shall be within 60 days ARO. Deliveries shall be 50 per month in lots of 50 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to DOT Warehouse..

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
5	6310-600-0530-8	153034	EA	SWITCH PACK TRAFFIC CONTROL SYSTEM DOT MODEL 200 Switch Pack (DOT #7440-0290-2), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Brand: TRAFFIC SENSOR Model: 200LS Delivery - Item 5 DOT Minimum Delivery: 400 Note: First delivery shall be within 60 days ARO. Deliveries shall be 400 per month in lots of 400 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to DOT Laboratory.	13.4000
6	6310-600-0534-5	224656	EA	MONITOR TRAFFIC CONTROL SYSTEM Model 210 (DOT #7440-0330-8), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Brand (Mod 210): EDI Model: 210 Conf. Monitor Delivery - Item 6 DOT Minimum Delivery: 100 Note: First delivery shall be within 60 days ARO. Deliveries shall be 100 per month in lots of 100 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to DOT Laboratory.	225.0000

Contract (Mandatory): 1-07-63-02

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
7	6310-600-0350-6	673900	EA	DETECTOR VEHICLE Model 222 Two-Channel Loop Detector, (DOT #7440-0350-0), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Price to include Two each Model 222 Loop and Detector Sensor Test Unit, per the minimum requirements of the noted Referenced Brand: Referenced Brand: Athens Technical Specialist Inc. (ATSI) Model: ALSA-1250 Automated Loop System Tester Brand (Mod 222): DIABLO Model: DSP222 (Two Each Testers to be included) Brand (Tester): ATSI Model: ALSA-1250 Delivery - Item 7 DOT Minimum Delivery: 400	32.4200

Note: First delivery shall be within 60 days ARO, Deliveries shall be 400 per month in lots of 400 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to DOT Laboratory.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
8	6310-600-0400-6	224656	EA	DETECTOR VEHICLE MAGNETIC PROBE Model 231 Probe (DOT #7440-0400-7), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Note: Cable Length shall be 100 ft. Brand: M Systems Model: 231 Probe w/100-cable Delivery - Item 8 DOT Minimum Delivery: 100 Note: First delivery shall be within 60 days ARO, Deliveries shall be 100 per month in lots of 100 per shipment. Delivery to DOT Laboratory.	110.0000
9	6310-600-0475-4	767230	EA	MODULE TRAFFIC CONTROL SYSTEM Model 242 Probe Two-Channel DC Isolator (DOT #7440-0475-5), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Brand: PDC Model: DCI-82C Delivery - Item 9 DOT Minimum Delivery: 200 Note: First delivery shall be within 60 days ARO, Deliveries shall be 200 per month in lots of 200 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to DOT Laboratory.	21.6000

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
10	6310-600-0532-1	153034	EA	FLASHER UNIT TRAFFIC CONTROL SYSTEM DOT MODEL 204 Flasher Unit (DOT #7440-0560-6), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Brand: PDC Model: SSF-88 Delivery - Item 10 DOT Minimum Delivery: 200 Note: First delivery shall be within 60 days ARO, Deliveries shall be 200 per month in lots of 200 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to DOT Laboratory.	13.7000
11	6310-600-0540-0	134203	EA	MODULE MEMORY TRAFFIC CONTROL SYSTEM DOT MODEL 412 Model 412C (DOT #7440-0576-0), per State of California, Department of Transportation (DOT) Qualified Products List, dated January 2007. Brand: SAFETRAN Model: 412C Delivery - Item 11 DOT Minimum Delivery: 50 Note: First delivery shall be within 60 days ARO, Deliveries shall be 50 per month in lots of 50 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to DOT Laboratory.	103.0000

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
12	6240-299-9637-0	673900	EA	SIGNAL TRAFFIC COMPONENT 300 MM GREEN BALL LED SIGNAL MODULES, TYPE I 300 MM 12", Plug-in Base (DOT #7440-0629-5), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: LEOTEK Model: TSL-12G-LX-IL1-A1 Delivery - Item 12 DOT Minimum Delivery: 600	53.0300

Note: First delivery shall be within 60 days ARO, Deliveries shall be 600 per month in lots of 600 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

Contract (Mandatory): 1-07-63-02

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
13	6240-299-9631-0	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM CIRCULAR RED LED SIGNAL MODULES TYPE I 300 MM 12", Plug-in Base (DOT #7440-0630-5), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: EOI (EXCELLENCE OPTO INC.) Model: TRV-R12EG-A Delivery - Item 13 DOT Minimum Delivery: 1000	30.6500

Note: First delivery shall be within 60 days ARO, Deliveries shall be 1000 per month in lots of 1000 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
14	6240-299-9638-2	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM GREEN ARROW LED SIGNAL MODULES, TYPE I 300 MM 12", Plug-in Base (DOT #7440-0634-3), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: EOI (EXCELLENCE OPTO INC.) Model: TRA-G12DF-G Delivery - Item 14 DOT Minimum Delivery: 600	36.5500

Note: First delivery shall be within 60 days ARO, Deliveries shall be 600 per month in lots of 600 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
15	6240-299-9633-3	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM ARROW RED LED SIGNAL MODULES TYPE I 300 MM 12", Plug-in Base (DOT #7440-0635-6), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: EOI (EXCELLENCE OPTO INC.) Model: TRA-R12DG-G Delivery - Item 15 DOT Minimum Delivery: 500	24.6800

Note: First delivery shall be within 60 days ARO, Deliveries shall be 500 per month in lots of 500 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
16	6240-299-9640-0	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM YELLOW BALL LED SIGNAL MODULES, TYPE I 300 MM 12", Plug-in Base (DOT #7440-0655-8), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: EOI (EXCELLENCE OPTO INC.) Model: TRV-Y12EG-A1 Delivery - Item 16 DOT Minimum Delivery: 600	38.7800

Note: First delivery shall be within 60 days ARO, Deliveries shall be 600 per month in lots of 600 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
17	6240-299-9641-2	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM YELLOW ARROW LED SIGNAL MODULES, TYPE I 300 MM 12", Plug-in Base (DOT #7440-0656-0), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: EOI (EXCELLENCE OPTO INC.) Model: TRA-Y12DG-G Delivery - Item 17 DOT Minimum Delivery: 500	25.6800

Note: First delivery shall be within 60 days ARO, Deliveries shall be 500 per month in lots of 500 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
18	6240-299-9642-4	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM GREEN PV LED SIGNAL MODULES, TYPE 2 300 MM 12", Screw-In (6" for 12" Head) (DOT #7440-0657-2), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: ELECTRO-TECH'S Model: PV30X6BG Delivery - Item 18 DOT Minimum Delivery: 500	67.9300

Note: First delivery shall be within 60 days ARO, Deliveries shall be 500 per month in lots of 500 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

Contract (Mandatory): 1-07-63-02

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
19	6240-000-0069-0	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM YELLOW TYPE II SCREW-IN 300 MM 12", Screw-In (6" for 12" Head) (DOT #7440-0658-4), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: ELECTRO-TECH'S Model: PV18X10YL Delivery - Item 19 DOT Minimum Delivery: 500	27.9300

Note: First delivery shall be within 60 days ARO, Deliveries shall be 500 per month in lots of 500 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
20	6240-299-9644-8	349990	EA	SIGNAL TRAFFIC COMPONENT 300 MM RED PV LED SIGNAL MODULES, TYPE 2 300 MM 12", Screw-In (6" for 12" Head) (DOT #7440-0659-6), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: ELECTRO-TECH'S Model: PV18X10RD Delivery - Item 20 DOT Minimum Delivery: 500	29.3700

Note: First delivery shall be within 60 days ARO, Deliveries shall be 500 per month in lots of 500 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
21	6240-299-9635-7	673900	EA	SIGNAL TRAFFIC COMPONENT LED PEDESTRIAN SIGNAL FACE (COMBINATION MODULE) Combo Face (DOT #7440-0670-9), per State of California, Department of Transportation (DOT) Pre-Qualified Products List, dated September 7, 2006. Price shall also include associated costs as described under "SITE" VISITATION FOR PRE-PRODUCTION AND PRODUCTION MEETINGS". Brand: LEOTEK Model: TSL-PED-16-DIL Delivery - Item 21 DOT Minimum Delivery: 200	76.0600

Note: First delivery shall be within 60 days ARO, Deliveries shall be 200 per month in lots of 200 per shipment, delivery schedule shall be indicated on the DOT Purchase Order as described above. Delivery to the DOT Warehouse.

ITEM NO.	COMMODITY NO. SUPPLIER PART NO.	SUPPLIER NO.	UNIT	DESCRIPTION	UNIT PRICE
				The following lines are for DGS Procurement Division use only.	
22	6310-600-0543-6	134203	EA	FOR DATA ENTRY USE ONLY	VARIABLE
23	6310-600-0543-6	767230	EA	FOR DATA ENTRY USE ONLY	VARIABLE
24	6310-600-0543-6	224656	EA	FOR DATA ENTRY USE ONLY	VARIABLE
25	6310-600-0543-6	153034	EA	FOR DATA ENTRY USE ONLY	VARIABLE
26	6310-600-0543-6	673900	EA	FOR DATA ENTRY USE ONLY	VARIABLE
27	6310-600-0543-6	349990	EA	FOR DATA ENTRY USE ONLY	VARIABLE

MODEL 170 TRAFFIC CONTROLLER
SHIPPING CARTON LABEL INSTRUCTIONS

Note: Label examples shown below are not to scale.
Labels shall be four (4) inches wide and two (2) inches high.

Example of Single Item per Carton:

CT # 7440-0100-1
Description:
MODEL 334C CABINET

PO # 12345 Dated 07/31/07

Box 1 of 1
Serial Number: C6789

ABC Company
Address

Example of Single Item per Several Cartons:

CT # 7440-0173-4
Description:
MODEL 170E CONTROLLER

PO # 12345 Dated 07/31/07

Box 1of 3
Serial Number: C2468

ABC Company
Address

Example of Several Items per Carton:

CT # 7440-0560-6
Description:
MODEL 204 FLASHER UNIT

PO # 12345 Dated 07/31/07

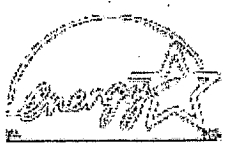
Box 1of 1
Serial Numbers Enclosed:
C120 – C200

ABC Company
Address

PURCHASE SPECIFICATION
LIGHT EMITTING DIODE (LED) SIGNAL MODULES

This specification is for the purchase of light emitting diode (LED) Traffic Signal Modules (herein referred to as modules) in the following configurations: the 300 mm circular sections, the 200 mm circular sections, the 300 mm arrow sections, bicycle sections, programmable visibility sections, and lane control sections.

All devices must meet the general specifications of the Transportation Electrical Equipment Specifications (TEES), Chapter 1--General Specifications, as well as the following specification. Incase of conflict, this specification shall govern over the TEES, Chapter 1.



1 Glossary

Wherever the following terms or abbreviations are used, the intent and meaning shall be interpreted as follows:

AlInGaP	Aluminum indium gallium phosphorus material used in the production of the LED
Cd	Candela. Unit of measurement of light intensity.
Chromaticity	The property of color of light
Conflict monitor	Model 210. A device used to prevent conflicting green phases in conjunction with a Model 170 controller. (see TEES)
Controller unit	Model 170 Traffic Signal Controller that is standard equipment on Caltrans maintained signalized intersections. (see TEES)
GaN	Gallium nitride material used in the production of the LED.
ITE	Institute of Traffic Engineers
LED	Light Emitting Diode.
Load switch	Series of devices used to switch power to signal indicators
MUTCD	Manual on Uniform Traffic Control Devices
METS	Material Engineering and Testing Services of the Translab.
NEMA	National Electrical Manufacturers Association
Power factor	The ratio of the real power component to the total (complex) power component.
PV	Programmable Visibility Head. A traffic signal indication that can be "programmed" to limit the visible area of the indication.
Rated power	The power consumption that the module was designed and tested for at ambient temperature (25C or 77F). See Design Qualification Testing.
TEES	Traffic Electrical Equipment Specifications. A package of standard specifications for traffic electrical equipment to be used on State Highways. This document is compiled by Caltrans Traffic Operations Program.
THD	Total Harmonic Distortion. The amount of higher frequency power on the power line
Type 1 module	LED module that is designed to be mounted in the place of the existing lens of a traffic signal.
Type 2 module	LED module that is designed to be mounted in the place of the incandescent lamp of a traffic signal utilizing the existing lens and lamp socket.
VTCSH	Vehicle Traffic Control Signal Head

2 General

2.1 Each module shall consist of an assembly that utilizes LEDs as the light source in lieu of an incandescent lamp for use in traffic signal sections.

2.2 The LEDs utilized in the modules shall be AlInGaP technology for red, amber and yellow indications, or GaN for green indications, and shall be the ultra bright type rated for 100,000 hours of continuous operation from -40°C to +74°C.

2.3 The modules shall be rated for a minimum useful life of 48 months. All modules shall meet all parameters of this specification during this period.

2.4 The individual LEDs shall be wired such that a catastrophic loss or the failure of one LED will not result in the loss of the entire module.

2.5 Electrical

2.5.1 Power Consumption

2.5.1.1 Maximum power consumption for LED modules is per Table 2-1.

2.5.1.2 LED modules will have EPA Energy Star compliance ratings, if applicable to that shape, size and color.

2.5.2 Operation Voltage

2.5.2.1 The modules shall operate from a 60 HZ ±3 HZ AC line over a voltage ranging from 95 volts to 135 volts. The fluctuations of line voltage shall have no visible effect on the luminous intensity of the indications.

2.5.2.2 Operating voltage of the modules shall be 120 VAC. All parameters shall measured at this voltage.

2.5.3 Power Factor
The LED signal module shall have a power factor of 0.90 or greater.

2.5.4 THD
Total harmonic distortion (current and voltage) induced into an AC power line by a LED signal module shall not exceed 20 percent.

2.5.5 Surge Suppression
The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients as stated in Section 2.1.6 of NEMA Standard TS-2, 1992.

2.5.6 The LED circuitry shall prevent perceptible flicker to the unaided eye over the voltage range specified above.

2.5.7 All wiring and terminal blocks shall meet the requirements of Section 13.02 of the ITE Publication: Equipment and Material Standards, Chapter 2 (Vehicle Traffic Control Signal Heads).

2.5.8 Compatibility
The modules shall be operationally compatible with currently used controller assemblies (solid state load switches, flashers, and conflict monitors). Review TEES Chapters 3 and 6 for specifications on these devices.

2.5.8.1 When a current of 20 mA AC (or less) is applied to the unit, the voltage read across the two leads shall be 15 VAC or less.

2.5.9 The modules and associated on-board circuitry must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

2.6 Photometric Requirements

2.6.1 The minimum initial luminous intensity values for the modules shall be as stated in Table 2-2 and/or Table 2-4 at 25°C.

2.6.1.1 The modules (excluding yellow) shall meet or exceed the illumination values as shown in Table 2-3 and/or Table 2-5, throughout the useful life based on normal use in a traffic signal operation over the operating temperature range.

2.6.1.2 Yellow modules shall meet or exceed the illumination values as shown in Table 2-3 and/or Table 2-5, throughout the useful life based on normal use in a traffic signal operation at 25°C.

2.6.2 The measured chromaticity coordinates of the modules shall conform to the chromaticity requirements of Table 2-6, throughout the useful life over the operating temperature range.

2.7 Physical and Mechanical Requirements

LED traffic signal modules shall be designed as retrofit replacements for existing optical units of signal indications and shall not require special tools for installation. See appropriate sections for Type 1 and Type 2 modules.

2.8 Environmental Requirements

2.8.1 The LED signal module shall be rated for use in the operating temperature range of -40°C (-40°F) to +74°C (+165°F). The modules shall meet all specifications throughout this range.

2.8.2 The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991 for Type 4 enclosures to protect all internal components.

2.9 Construction

2.9.1 The LED signal module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply for the module shall be integral to the unit.

2.9.2 The circuit board and power supply shall be contained inside the module. Circuit boards shall conform to Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications".

2.9.3 The assembly and manufacturing process for the LED signal assembly shall be designed to assure all internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

2.10 Materials

2.10.1 Material used for the lens and signal module construction shall conform to ASTM specifications for the materials.

2.10.2 Enclosures containing either the power supply or electronic components of the signal module shall be made of UL94VO flame retardant materials. The lens of the signal module is excluded from this requirement.

2.11 Module Identification

2.11.1 Each module shall have the manufacturer's name, trademark, model number, serial number, date of manufacture (month-year), and lot number as identification permanently marked on the back of the module.

2.11.2 The following operating characteristics shall be permanently marked on the back of the module: rated voltage and rated power in Watts and Volt-Ampere.

2.11.3 Each module shall have a symbol of the type of module (i.e. circle, arrow, etc.) in the color of the module. The symbol shall be one inch (25.4 mm) in diameter. Additionally, the color shall be written out in ½ in letters next to the symbol.

2.11.4 If a specific mounting orientation is required, each module shall have prominent and permanent marking(s) for correct indexing and orientation within a signal housing. The markings shall consist of an up arrow, or the word "UP" or "TOP".

3 Type 1 Traffic Signal Module

The following specification requirements apply to the Type 1 module only. All general specifications apply unless specifically superceded in this section.

3.1 Type 1 modules can be manufactured under this specification for the following faces:

3.1.1 300 mm circular

3.1.2 200 mm circular

3.1.3 300 mm arrow

3.1.4 Bicycle indication (future)

3.1.5 Lane Control (future)

3.2 Physical and Mechanical Requirements

3.2.1 The module shall fit into existing traffic signal section housings built to the specifications detailed in ITE Publication: Equipment and Material Standards, Chapter2 (Vehicle Traffic Control Signal Heads).

3.2.2 Each Type 1 module shall be designed to be installed in the doorframe of a standard traffic signal housing. The Type 1 module shall be sealed in the doorframe with a one-piece EPDM (ethylene propylene rubber) gasket.

3.2.3 The maximum weight of a Type 1 module shall be 1.8 kg (4 lbs.).

3.2.4 Each Type 1 module shall be a sealed unit to include all parts necessary for operation (a printed circuit board, power supply, a lens and gasket, etc.), and shall be weather proof after installation and connection.

3.2.5 Conductors
Two secured, color coded, 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electric Code, rated for service at +105°C, are to be provided for electrical connection for each Type 1 LED signal module. Conductors for Type 1 modules shall be 1-m in length, with quick disconnect terminals attached and shall conform to Section 86-4.01C, "Electrical Components," of the Standard Specifications.

3.2.6 If specified in the purchased order, the module will be equipped with an adapter that will screw into the medium base, lamp socket. The adapter shall be able to accept the quick disconnect terminals at the end of the conductors for the module. The electrical contacts of the adapter shall be made of brass.

3.3 Lens

3.3.1 The lens of the Type 1 module shall be integral to the unit, shall be convex with a smooth outer surface and made of plastic or of glass.

3.3.2 The lens may be tinted or may use transparent film or materials with similar characteristics to enhance ON/OFF contrasts.

3.3.2.1 The use of tinting or other materials to enhance ON/OFF contrasts shall not affect chromaticity and shall be uniform across the face of the lens.

3.3.3 The LED signal module lens shall be UV stabilized and shall be capable of withstanding ultraviolet (direct sunlight) exposure for a minimum period of 60 months without exhibiting evidence of deterioration.

3.3.4 If a polymeric lens is used, a surface coating or chemical surface treatment shall be used to provide front surface abrasion resistance.

4 Type 2 Traffic Signal Module

The following specification requirements apply to the Type 2 module only. All general specifications apply unless specifically superceded in this section.

4.1 Type 2 modules can be manufactured under this specification for the following faces:

4.1.1 300 mm circular

4.1.2 200 mm circular

4.1.3 300 mm arrow

4.1.4 Programmed Visibility (red, yellow, green)

4.2 Physical and Mechanical Requirements

4.2.1 The module shall fit into existing traffic signal section housings built to the specifications detailed in the ITE Publication: Equipment and Material Standards, Chapter 2 (Vehicle Traffic Control Signal Heads), with the existing lens, reflector and lamp socket remaining in place, and without modification to the housing.

4.2.2 Each Type 2 module shall be designed to mount in the standard lamp socket normally used with an incandescent lamp.

4.2.3 The maximum weight of a Type 2 module shall be 1.4 kg (3 lbs.).

4.2.4 Type 2 modules shall be a sealed unit containing all components necessary for operation.

4.3 The installation of a Type 2 module shall not require any removal of, or modification to the standard lamp socket or reflector. The installation of a Type 2 module shall not require special tools.

5 300 mm Arrow

The following specification requirements apply to the 300 mm arrow module only. All general specifications apply unless specifically superceded in this section.

5.1 The arrow module shall meet specifications stated in Section 9.01 of the ITE Publication: Equipment and Material Standards, Chapter 2 (Vehicle Traffic Control Signal Heads) for arrow indications.

5.2 The LEDs shall be spread evenly across the illuminated portion of the arrow area.

6 300 mm Bicycle

The following specification requirements apply to the 300 mm bicycle module only. All general specifications apply unless specifically superceded in this section.

6.1 The bicycle module shall approximate shape and size specifications as shown in Figure 6-1 for bicycle signal face. Caltrans shall make the final determination as to the conformance to the intent of the specification.

6.2 The LEDs shall be spread evenly across the illuminated portion of the bicycle area.

7 300 mm Programmed Visibility (PV)

The following specification requirements apply to the 300 mm PV module only. All general specifications apply unless specifically superceded in this section.

7.1 The module shall be a Type 2 module designed and constructed to be installed in a programmed visibility (PV) signal housing with out modification to the housing.

7.2 The LEDs shall be spread evenly across the module.

8 300 mm Lane Control

The following specification requirements apply to the 300 mm lane control module only. The lane control module is a single, combination module with both a red X and green arrow. All general specifications apply unless specifically superceded in this section.

8.1 The lane control module shall approximate shape and size specifications as shown in Figures 8-1 and 8-2 for lane control modules. Caltrans shall make the final determination as to the conformance to the intent of the specification.

8.2 Three secured, color coded, 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electric Code, rated for service at +105°C, are to be provided for electrical connection for each lane control LED signal module. Conductors for this module shall be 1-m in length, with quick disconnect terminals attached and shall conform to Section 86-4.01C, "Electrical Components," of the Standard Specifications. The color code is as follows:

Function	Color
neutral	white
red X	red
green arrow	brown

8.3 The LEDs shall be spread evenly across the illuminated portions of this module.

9 Quality Assurance

9.1 The modules shall be manufactured in accordance with a manufacturer quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of The modules built to meet this specification, and a documented process of how problems are to be resolved.

9.2 QA process and test results documentation shall be kept on file for a minimum period of seven years.

9.3 LED signal module designs not satisfying design qualification testing and the production quality assurance testing performance requirements described below shall not be labeled, advertised, or sold as conforming to this specification.

9.4 Design Qualification Testing

9.4.1 Design Qualification Testing shall be performed by the manufacturer or an independent testing lab hired by the manufacturer on new LED module designs, and when a major design change has been implemented on an existing design.
A major design change is defined as a design change (electrical or physical) which changes any of the performance characteristics of the module, results in a different circuit configuration for the power supply, or changes the layout of the individual LED's in the module.

9.4.2 A quantity of two units for each design shall be submitted for Design Qualification Testing.

9.4.2.1 Test units shall be submitted to Caltrans after the manufacturer's testing is complete.

9.4.2.2 Manufacturer's testing data shall be submitted with test units for Caltrans verification of Design Qualification Testing data.

9.4.3 Burn In.
The sample modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of +74°C (+165°F) before performing any design qualification testing.

9.4.4 Any failure of the module, which renders the unit non-compliant with the specification after burn-in, shall be cause for rejection.

9.4.5 For Design Qualification Testing, all specifications will be measured including, but not limited to:

9.4.5.1 Rated Initial Luminous Intensity.
Measured at +25°C.

9.4.5.2 Chromaticity (Color).
Measured at +25°C.

9.4.5.3 Electrical.
All specified parameters shall be measured and used for quality comparison of production quality assurance on production modules. (rated power, etc)

9.4.5.4 Equipment Compatibility.
Modules shall be tested for compatibility with the controller unit, conflict monitor, and load switch. Each signal module shall be connected to the output of a standard load switch connected to an AC voltage supply between the values of 95 and 135 VAC with the input to the load switch in the "off" position. The AC voltage developed across each LED signal module so connected shall not exceed 10 Vrms as the input AC voltage is varied from 95 Vrms to 135 Vrms.

9.4.5.5 Mechanical vibration testing shall be as per MIL-STD-883, Test Method 2007, using 3 four minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 HZ to 120 HZ. The loosening of the lens, of any internal components, or other physical damage shall be cause for rejection.

9.4.5.6 Temperature cycling shall be performed as per MIL-STD-883, Test method 1010. The temperature range shall be per "Environmental Requirements". A minimum of 20 cycles shall be performed with a 30 minute transfer time between temperature extremes and a 30 minute dwell time at each temperature. Module(s) being tested shall be energized and functioning throughout the duration of the test. Failure of a module to function properly or any evidence of cracking of the module lens or housing after temperature cycling shall be cause for rejection.

9.5 Production Quality Control Testing.

9.5.1 The following Production Quality Assurance tests shall be performed on each new module prior to shipment. Failure to meet requirements of any of these tests shall be cause for rejection. Test results shall be retained by the manufacturer for seven years.

9.5.2 Burn-in period shall consist of each signal module being energized at rated voltage for a 30 minute stabilization period before the measurement is made (except for yellow modules).

9.5.3 Each module shall be tested for rated initial intensity after burn-in.

9.5.3.1 A single point measurement, with a correlation to the intensity requirements of Table 2-2 for circular modules, may be used.

9.5.3.2 The ambient temperature for this measurement shall be +25°C (+77°F).

9.5.3.3 Each module not meeting minimum luminous intensity requirements per Table 2-2 or Table 2-4 shall be cause for rejection.

9.5.4 Each module shall be tested for required power factor after burn-in.

9.5.5 Each module shall be measured for current flow in amperes after burn-in. The measured current values shall be compared against rated values resulting from design qualification measurements under "Design Qualification Testing". The current flow shall not exceed the rated value.

9.5.6 Each module shall be visually inspected for any exterior physical damage or assembly anomalies. Careful attention shall be paid to the surface of the lens to ensure there are no scratches (abrasions), cracks, chips, discoloration, or other defects. Any such defect shall be cause for rejection.

9.6 Caltrans Quality Assurance Testing. (random sample testing)

9.6.1 Caltrans may perform random sample testing on all shipments.

9.6.2 Random sample testing should be completed within than 30 days after delivery to the specified location on the purchase order.

9.6.3 Circular modules shall be tested according to California Test No. 604, and as described herein.

9.6.4 PV, bicycle and arrow modules shall be tested as per California Test 3001 and as described herein.

9.6.5 All optical testing shall be performed with the module mounted in a standard traffic signal section without a visor or hood attached to the section or housing.

9.6.6 The number of units tested (sample size) shall be determined by the quantity of each model in the shipment. The sample size shall conform to ANSI/ASQC Z1.4. The Caltrans METS shall determine the sampling parameters to be used for the random sample testing.

9.6.7 All parameters of the specification may be tested on the shipment sample.

9.6.8 Acceptance/Rejection of the shipment shall conform to ANSI/ASQC Z1.4 for random sampled shipments.

10 Warranty

In addition to meeting the performance requirements for the minimum period of 48 months, the manufacturer shall provide a written warranty against defects in materials and workmanship for the modules for a period of 60 months after acceptance of the modules. Replacement modules shall be provided promptly after receipt of modules that have failed at no cost to the State. All warranty documentation shall be given to the TransLab prior to random sample testing.

TABLES

Table 2-1 Maximum PowerConsumption (in Watts)

	Red		Yellow		Green	
Temperature	25°C	74°C	25°C	74°C	25°C	74°C
300 mm circular	11	17	22	25	15	15
200 mm circular	8	13	13	16	12	12
300 mm arrow	9	12	10	12	11	11
Bicycle indication	11	17	22	25	15	15
PV indication	11	17	22	25	15	15
Lane Control (X)	9	12	n/a	n/a	n/a	n/a
Lane Control (Arrow)	n/a	n/a	n/a	n/a	11	11

Table 2-2 Minimum Initial Intensities for Circular Indications (in cd)

		200 mm			300 mm	
Angle (v,h)	Red	Yellow	Green	Red	Yellow	Green
2.5, ±2.5	157	314	314	399	798	798
2.5, ±7.5	114	228	228	295	589	589
2.5, ±12.5	67	133	133	166	333	333
2.5, ±17.5	29	57	57	90	181	181
7.5, ±2.5	119	238	238	266	532	532
7.5, ±7.5	105	209	209	238	475	475
7.5, ±12.5	76	152	152	171	342	342
7.5, ±17.5	48	95	95	105	209	209
7.5, ±22.5	21	43	43	45	90	90
7.5, ±27.5	12	24	24	19	38	38
12.5, ±2.5	43	86	86	59	119	119
12.5, ±7.5	38	76	76	57	114	114
12.5, ±12.5	33	67	67	52	105	105
12.5, ±17.5	24	48	48	40	81	81
12.5, ±22.5	14	29	29	26	52	52
12.5, ±27.5	10	19	19	19	38	38
17.5, ±2.5	19	38	38	26	52	52
17.5, ±7.5	17	33	33	26	52	52
17.5, ±12.5	12	24	24	26	52	52
17.5, ±17.5	10	19	19	26	52	52
17.5, ±22.5	7	14	14	24	48	48
17.5, ±27.5	5	10	10	19	38	38

Table 2-3 Maintained Minimum Intensities for Circular Indications (in cd)

		200 mm			300 mm	
Angle (v,h)	Red	Yellow	Green	Red	Yellow	Green
2.5, ±2.5	133	267	267	339	678	678
2.5, ±7.5	97	194	194	251	501	501
2.5, ±12.5	57	113	113	141	283	283
2.5, ±17.5	25	48	48	77	154	154
7.5, ±2.5	101	202	202	226	452	452
7.5, ±7.5	89	178	178	202	404	404
7.5, ±12.5	65	129	129	145	291	291
7.5, ±17.5	41	81	81	89	178	178
7.5, ±22.5	18	37	37	38	77	77
7.5, ±27.5	10	20	20	16	32	32
12.5, ±2.5	37	73	73	50	101	101
12.5, ±7.5	32	65	65	48	97	97
12.5, ±12.5	28	57	57	44	89	89
12.5, ±17.5	20	41	41	34	69	69
12.5, ±22.5	12	25	25	22	44	44
12.5, ±27.5	9	16	16	16	32	32
17.5, ±2.5	16	32	32	22	44	44
17.5, ±7.5	14	28	28	22	44	44
17.5, ±12.5	10	20	20	22	44	44
17.5, ±17.5	9	16	16	22	44	44
17.5, ±22.5	6	12	12	20	41	41
17.5, ±27.5	4	9	9	16	32	32

Table 2-4 Minimum Initial Intensities for Arrow and PV Indications (in cd/m2)

	Red	Yellow	Green
Arrow Indication	5,500	11,000	11,000
Bicycle Indication	5,500	5,500	5,500
PV Indication	future	future	future
Lane Control (X)	5,500	n/a	n/a
Lane Control (Arrow)	n/a	n/a	11,000

Table 2-5 Minimum Maintained Intensities for Arrow and PV Indications (in cd/m2)

	Red	Yellow	Green
Arrow Indication	5,500	11,000	11,000
Bicycle Indication	5,500	5,500	5,500
PV Indication	future	future	future
Lane Control (X)	5,500	n/a	n/a
Lane Control (Arrow)	n/a	n/a	11,000

Table 2-6 Chromaticity Standards (CIE Chart)
Section 8.04 of

Red	Y: not greater than 0.308, or less than 0.998 - x
Yellow	Y: not less than 0.411, nor less than 0.995 - x, nor less than 0.452
Green	Y: Not less than 0.506 -.519x, nor less than 0.150 + 1.068x, nor more than 0.730 - x

Figure 6-1 Bicycle module symbol

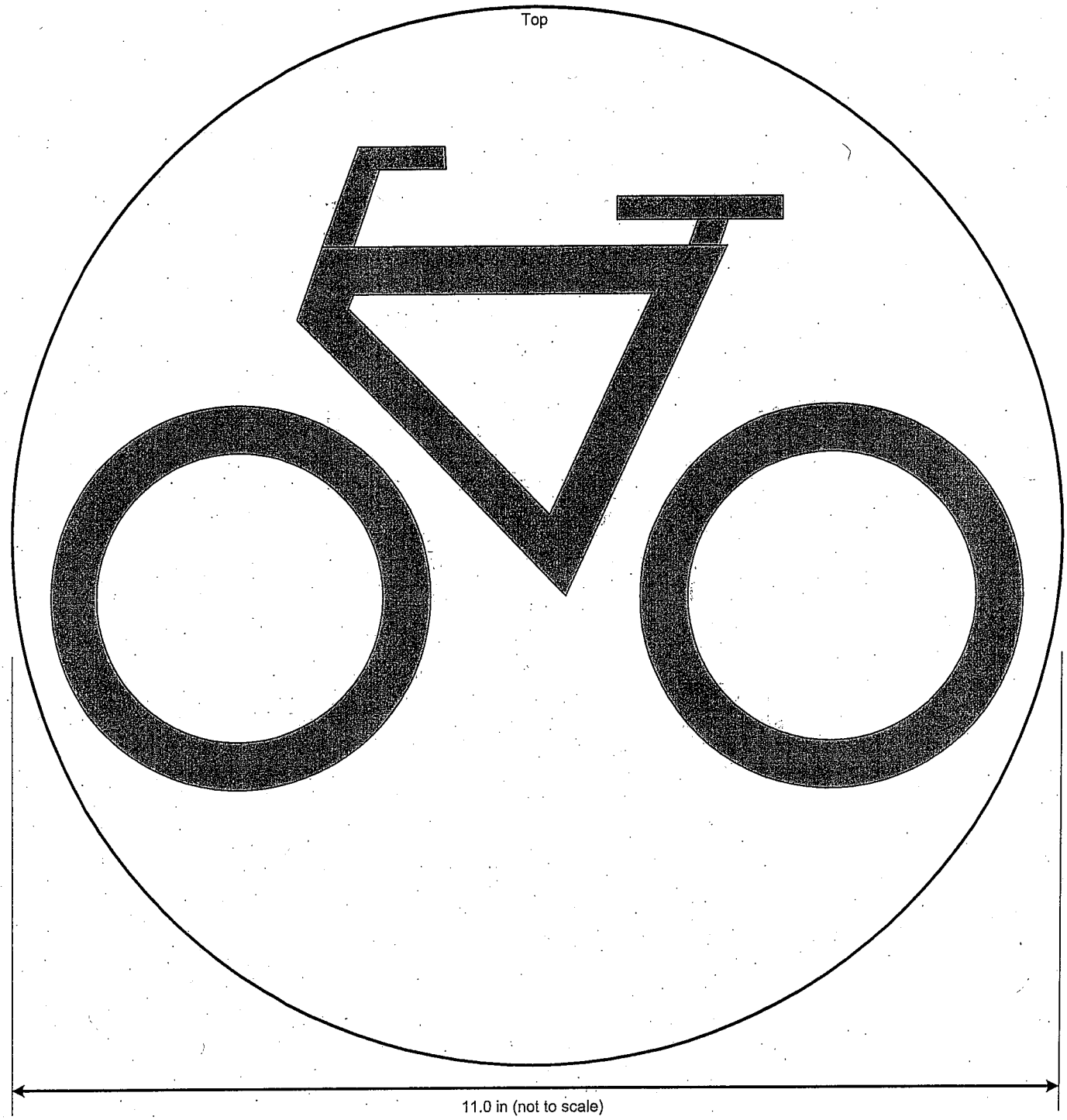


Figure 8-1 Lane Control X symbol

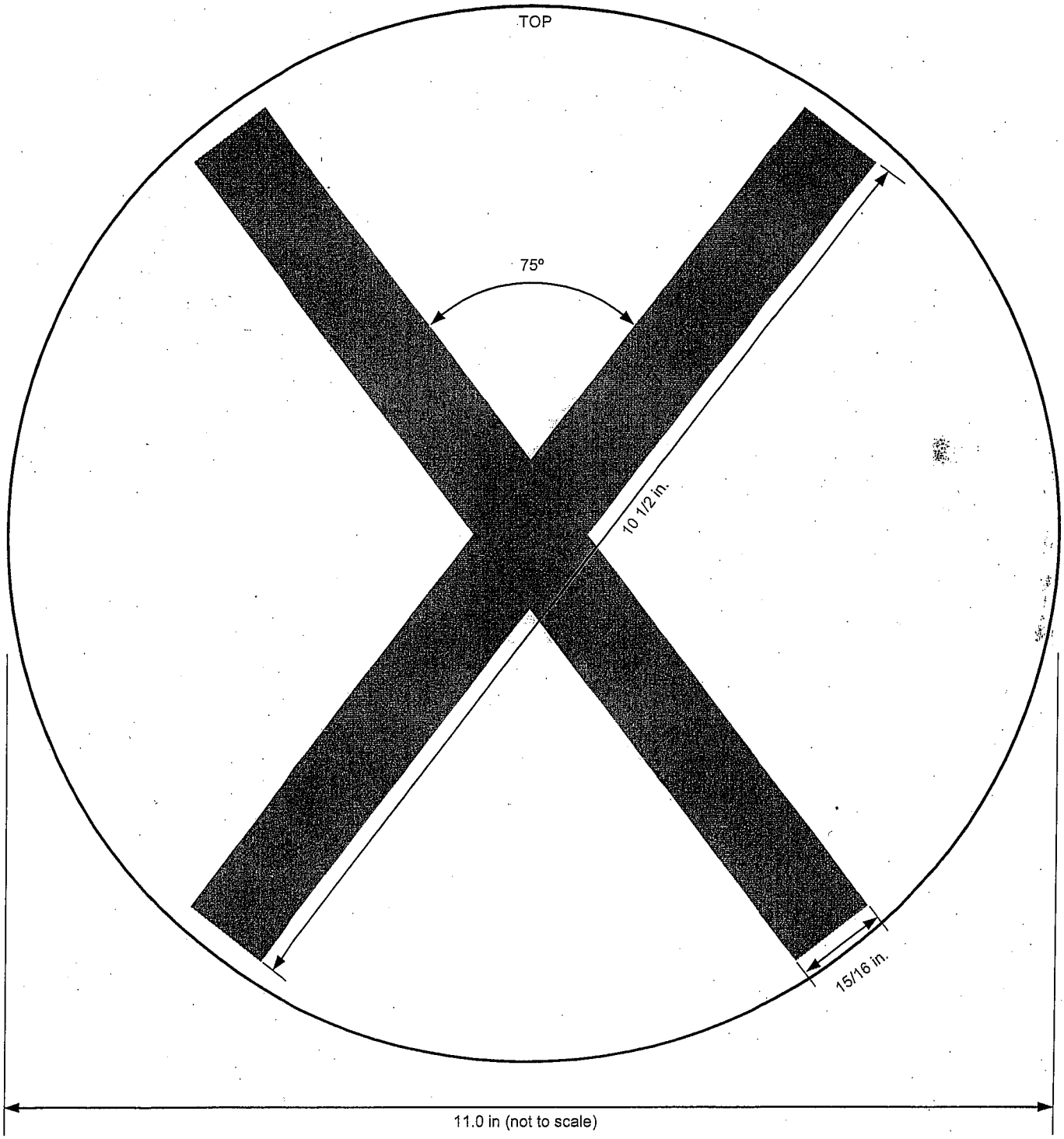
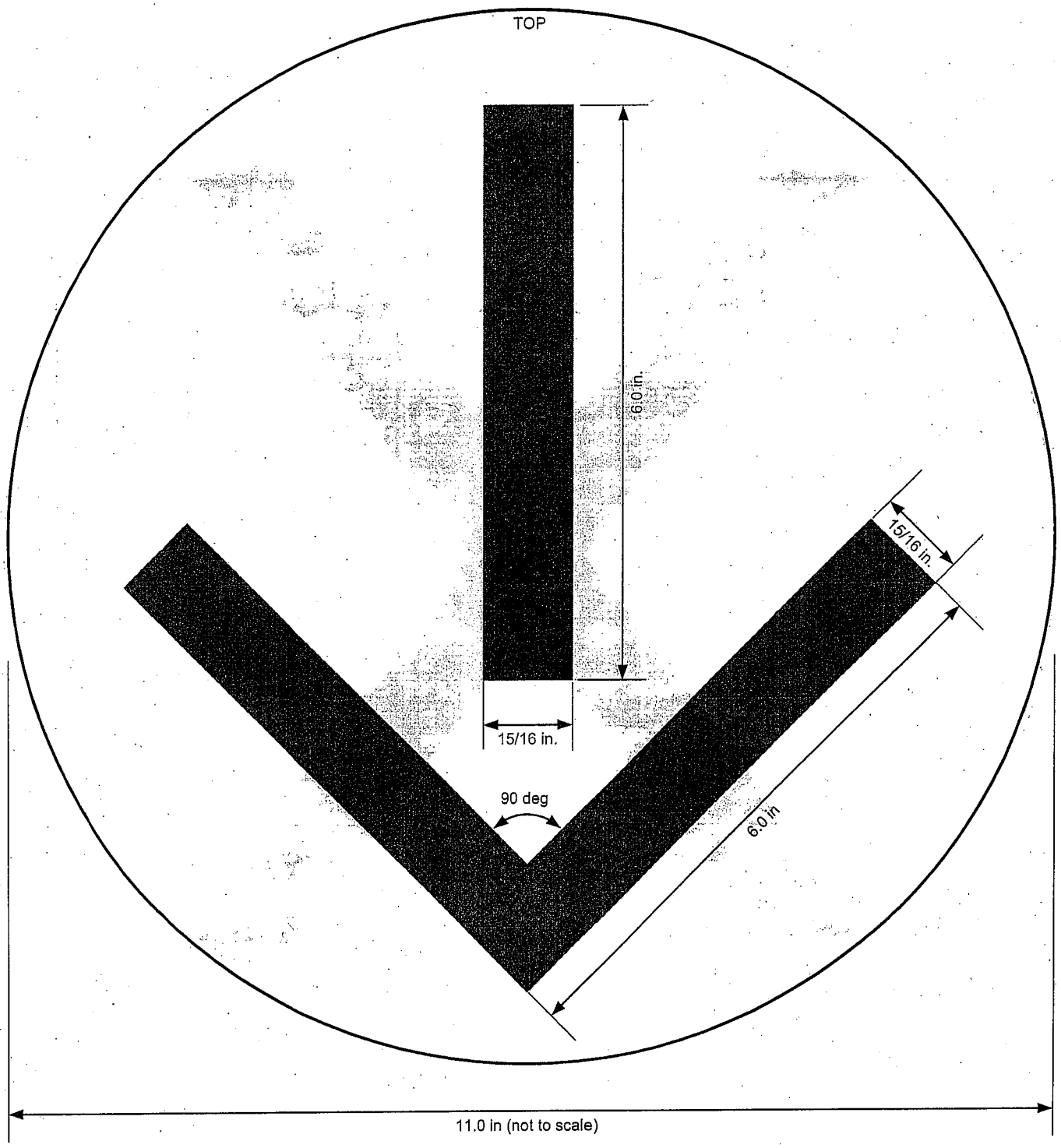


Figure 8-2 Lane Control Arrow symbol



PURCHASE SPECIFICATION
LIGHT EMITTING DIODE (LED) SIGNAL MODULES
(COMBINATION PEDESTRIAN SIGNAL)

This specification is for the purchase of LED Traffic Signal Modules (herein referred to as modules) in the following configurations: Pedestrian Signal Face (Combination Signal) shall utilize light emitting diode signal modules.

All devices must meet the general specifications of the Transportation Electrical Equipment Specifications (TEES), Chapter 1--General Specifications, as well as the following specification. Incase of conflict, this specification shall govern over the TEES, Chapter 1.

1 Glossary

Wherever the following terms or abbreviations are used, the intent and meaning shall be interpreted as follows:

Cd	Candela. Unit of measurement of light intensity.
Chromaticity	The property of color of light
Conflict monitor	Model 210. A device used to prevent conflicting green phases in conjunction with a Model 170 controller. (see TEES)
Controller unit	Model 170 Traffic Signal Controller that is standard equipment on Caltrans maintained signalized intersections. (see TEES)
ITE	Institute of Traffic Engineers
LED	Light Emitting Diode.
Load switch	Series of devices used to switch power to signal indicators
MUTCD	Manual on Uniform Traffic Control Devices
METS	Material Engineering and Testing Services of the Translab.
NEMA	National Electrical Manufacturers Association
Power factor	The ratio of the real power component to the total (complex) power component.
PTCSH	Pedestrian Traffic Control Signal Head
Rated power	The power consumption that the module was designed and tested for at ambient temperature (25C or 77F). See Design Qualification Testing.
TEES	Traffic Electrical Equipment Specifications. A package of standard specifications for traffic electrical equipment to be used on State Highways. This document is compiled by Caltrans Traffic Operations Program.
THD	Total Harmonic Distortion. The amount of higher frequency power on the power line
Type 1 module	LED module that is designed to be mounted in the place of the existing lens of a traffic signal.
Type 2 module	LED module that is designed to be mounted in the place of the incandescent lamp of a traffic signal utilizing the existing lens and lamp socket.
VTCSH	Vehicle Traffic Control Signal Head

2 General

2.1 Each module shall consist of an assembly that utilizes LEDs as the light source in lieu of an incandescent lamp for use in traffic signal sections.

2.2 The LEDs shall utilize appropriate technology to achieve the required color and shall be the ultra bright type rated for 100,000 hours of continuous operation from -40°C to +74°C.

2.3 The modules shall be rated for a minimum useful life of 48 months. All modules shall meet all parameters of this specification during this period.

2.4 The individual LEDs shall be wired such that a catastrophic loss or the failure of one LED will result in the loss of not more than 5 percent of the signal module light output.

2.5 Electrical

2.5.1 Power Consumption
Maximum power consumption requirements for the are as follows:

	25°C	74°C
Pedestrian Signal	15.0 W	18.0 W

2.5.2 Operation Voltage

2.5.2.1 The modules shall operate from a 60 HZ ±3 HZ AC line over a voltage ranging from 95 volts to 135 volts. The fluctuations of line voltage shall have no visible effect on the luminous intensity of the indications.

2.5.2.2 Operating voltage of the modules shall be 120 VAC. All parameters shall measured at this voltage.

2.5.3 Power Factor
The LED signal module shall have a power factor of 0.90 or greater.

2.5.4 THD
Total harmonic distortion (current and voltage) induced into an AC power line by a LED signal module shall not exceed 20 percent.

2.5.5 Surge Suppression
The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients as stated in Section 2.1.6 of NEMA Standard TS-2, 1992.

2.5.6 The LED circuitry shall prevent perceptible flicker to the unaided eye over the voltage range specified above.

2.5.7 All wiring and terminal blocks shall meet the requirements of Section 13.02 of the ITE Publication: Equipment and Material Standards.

2.5.8 The modules shall be operationally compatible with currently used controller assemblies (solid state load switches, flashers, and conflict monitors). Review TEES Chapters 3 and 6 for specifications on these devices.

2.5.9 The modules and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

2.6 Environmental Requirements

2.6.1 The LED signal module shall be rated for use in the operating temperature range of -40°C (-40°F) to +74°C (+165°F). The modules shall meet all specifications throughout this range.

2.6.2 The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991 for Type 4 enclosures to protect all internal components.

2.7 Construction

2.7.1 The LED signal module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply for the module shall be integral to the unit.

2.7.2 The circuit board and power supply shall be contained inside the module. Circuit boards shall conform to Chapter 1, Section 6 of the "Transportation Electrical Equipment Specifications".

2.7.3 The assembly and manufacturing process for the LED signal assembly shall be designed to assure all internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

2.8 Materials

2.8.1 Material used for the lens and signal module construction shall conform to ASTM specifications for the materials.

2.8.2 Enclosures containing either the power supply or electronic components of the signal module shall be made of UL94VO flame retardant materials. The lens of the signal module is excluded from this requirement.

2.9 Module Identification

2.9.1 Each module shall have the manufacturer's name, trademark, model number, serial number, date of manufacture (month-year), and lot number as identification permanently marked on the back of the module.

2.9.2 The following operating characteristics shall be permanently marked on the back of the module: rated voltage and rated power in Watts and Volt-Ampere.

2.9.3 If a specific mounting orientation is required, each module shall have prominent and permanent marking(s) for correct indexing and orientation within a signal housing. The markings shall consist of an up arrow, or the word "UP" or "TOP".

3 Type A Pedestrian Signal Face (Combination Raised Hand/Walking Figure section)

The following specifications requirements apply to the Walking Figure section only. All general specifications apply unless specifically superceded in this section.

3.1 General

3.1.1 Pedestrian signal face modules shall be designed to mount behind or replace the existing face plate of existing Type "A" housing as specified by the requirements of the ITE Standards: "Pedestrian Traffic Control Signal Indications" and the MUTCD.

3.1.2 The design of the modules shall require a specific mounting orientation.

3.2 Photometric Requirements

3.2.1 Each module shall provide an average luminous intensity of at least 3,750 candela/m^2 throughout the useful life over the operating temperature range.

3.2.2 The uniformity ratio of an illuminated symbol shall not exceed 4 to 1 between the highest luminance area and the lowest luminance area in the module.

3.2.3 The color output of the module shall conform to the requirements of the ITE: "Pedestrian Traffic Control Signal Indications" and the MUTCD. The measured chromaticity coordinates of the modules shall conform to the chromaticity requirements of Section 5.3.2.1 and Figure C of the VTCSH standard.

3.2.3.1 Raised Hand shall be Portland orange.

3.2.3.2 Walking figure shall be lunar white.

3.3 Physical and Mechanical Requirements

3.3.1 The module shall be designed to be used in the pedestrian signal section as retrofit replacement for existing signal lamps and shall not require special tools for installation.

3.3.1.1 The module shall fit into existing pedestrian signal section housings built to the PTCSH specifications without modification to the housing.

3.3.2 The height of each symbol on the module shall be not less than 250 mm and the width of each symbol on the module shall not be less than 165 mm.

3.4 Construction

The modules shall be a single, self-contained device, not requiring on-site assembly for installation into an existing Type "A" housing.

4 Quality Assurance

4.1 The modules shall be manufactured in accordance with a manufacturer quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of The modules built to meet this specification, and a documented process of how problems are to be resolved.

4.2 QA process and test results documentation shall be kept on file for a minimum period of seven years.

4.3 LED signal module designs not satisfying design qualification testing and the production quality assurance testing performance requirements described below shall not be labeled, advertised, or sold as conforming to this specification.

4.4 Design Qualification Testing

4.4.1 Design Qualification Testing shall be performed by the manufacturer or an independent testing lab hired by the manufacturer on new LED module designs, and when a major design change has been implemented on an existing design.
A major design change is defined as a design change (electrical or physical) which changes any of the performance characteristics of the module, results in a different circuit configuration for the power supply, or changes the layout of the individual LED's in the module.

4.4.2 A quantity of two units for each design shall be submitted for Design Qualification Testing.

4.4.2.1 Test units shall be submitted to Caltrans after the manufacturer's testing is complete.

4.4.2.2 Manufacturer's testing data shall be submitted with test units for Caltrans verification of Design Qualification Testing data.

4.4.3 Burn In.
The sample modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of +74°C (+165°F) before performing any design qualification testing.

4.4.4 Any failure of the module, which renders the unit non-compliant with the specification after burn-in, shall be cause for rejection.

4.4.5 For Design Qualification Testing, all specifications will be measured including, but not limited to:

4.4.5.1 Rated Initial Luminous Intensity.
Measured over the operating temperature range.

4.4.5.2 Chromaticity (Color).
Measured over the operating temperature range.

4.4.5.3 Electrical.
All specified parameters shall be measured and used for quality comparison of production quality assurance on production modules. (rated power, etc)

4.4.5.4 Equipment Compatibility.
Modules shall be tested for compatibility with the controller unit, conflict monitor, and load switch. Each signal module shall be connected to the output of a standard load switch connected to an AC voltage supply between the values of 95 and 135 VAC with the input to the load switch in the "off" position. The AC voltage developed across each

LED signal module so connected shall not exceed 10 Vrms as the input AC voltage is varied from 95 Vrms to 135 Vrms.

4.4.5.5 Mechanical vibration testing shall be as per MIL-STD-883, Test Method 2007, using 3 four minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 HZ to 120 HZ. The loosening of the lens, of any internal components, or other physical damage shall be cause for rejection.

4.4.5.6 Temperature cycling shall be performed as per MIL-STD-883, Test method 1010. The temperature range shall be per "Environmental Requirements". A minimum of 20 cycles shall be performed with a 30 minute transfer time between temperature extremes and a 30 minute dwell time at each temperature. Module(s) being tested shall be energized and functioning throughout the duration of the test. Failure of a module to function properly or any evidence of cracking of the module lens or housing after temperature cycling shall be cause for rejection.

4.4.5.7 Moisture resistance testing shall be performed on all modules mounted in a standard type "A" pedestrian housing per NEMA Standard 250-1991 for Type 4 enclosures. Any evidence of internal moisture after testing shall be cause for rejection.

4.5 Production Quality Control Testing.

4.5.1 The following Production Quality Assurance tests shall be performed on each new module prior to shipment. Failure to meet requirements of any of these tests shall be cause for rejection. Test results shall be retained by the manufacturer for seven years.

4.5.2 Burn-in period shall consist of each signal module being energized at rated voltage for a 30 minute stabilization period before the measurement is made.

4.5.3 Each module shall be tested for rated initial intensity after burn-in.

4.5.3.1 A single point measurement, with a correlation to the intensity requirements of Section 1.04 of the VTCSH for circular modules, may be used.

4.5.3.2 The ambient temperature for this measurement shall be +25°C (+77°F).

4.5.3.3 Each module not meeting minimum luminous intensity requirements per Table 1 of VTCSH for circular modules, 11,000 cd/m^2 for arrow modules, or 3,750 cd/m^2 for pedestrian modules shall be cause for rejection.

4.5.4 Each module shall be tested for required power factor after burn-in.

4.5.5 Each module shall be measured for current flow in amperes after burn-in. The measured current values shall be compared against rated values resulting from design qualification measurements under "Design Qualification Testing". The current flow shall not exceed the rated value.

4.5.6 Each module shall be visually inspected for any exterior physical damage or assembly anomalies. Careful attention shall be paid to the surface of the lens to ensure there are no scratches (abrasions), cracks, chips, discoloration, or other defects. Any such defect shall be cause for rejection.

4.6 Caltrans Quality Assurance Testing. (random sample testing)

4.6.1 Caltrans may perform random sample testing on all shipments.

4.6.2 Random sample testing should be completed within than 30 days after delivery to the specified location on the purchase order.

4.6.3 Circular modules shall be tested according to California Test No. 604, and as described herein.

4.6.4 Pedestrian "upraised hand" shall be tested according to California Test No. 606 and as described herein.

4.6.5 All optical testing shall be performed with the module mounted in a standard traffic signal section or in a standard Type "A" Pedestrian Housing, but without a visor or hood attached to the section or housing.

4.6.6 The number of units tested (sample size) shall be determined by the quantity of each model in the shipment. The sample size shall conform to ANSI/ASQC Z1.4. The Caltrans METS shall determine the sampling parameters to be used for the random sample testing.

4.6.7 All parameters of the specification may be tested on the shipment sample.

4.6.8 Acceptance/Rejection of the shipment shall conform to ANSI/ASQC Z1.4 for random sampled shipments.

5 Warranty

The manufacturer shall provide a written warranty against defects in materials and workmanship for the modules for a period of 48 months after acceptance of the modules. Replacement modules shall be provided promptly after receipt of modules that have failed at no cost to the State. All warranty documentation shall be given to the TransLab prior to random sample testing.